PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
PO156PCT/MCG		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IE2004/000042	25.03.2004	03.04.2003

International Patent Classification (IPC) or national classification and IPC
G06F17/30

Applicant
DUBLIN CITY UNIVERSITY

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 1 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
23.02.2005	23.06.2005

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IE2004/000042

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-21	as originally filed
Claims, Numbers	
6-19	as originally filed
1-5	received on 26.01.2005 with letter of 25.01.2005
Drawings, Sheets	
1/6-6/6	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 19

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 19

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form	☐	has not been furnished
	☐	does not comply with the standard
the computer readable form	☐	has not been furnished
	☐	does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☒ See separate sheet for further details

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-18
	No:	Claims	-
Inventive step (IS)	Yes:	Claims	-
	No:	Claims	1-18
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	-

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claim 19 refers to other parts of the application, which is contrary to Rule 6.2a PCT. It is indeed not possible to clearly define the claim based only on the drawings.
Therefore, no meaningful search could be carried out for claim 19, and no opinion can be given on this claim.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The following documents (D1, D2, D3, D4) are referred to in this communication:

D1: LIANG-KAI H ET AL: "Efficient shape matching through model-based shape recognition" (1996-02-01), XP004006252
D2: VAN DER HEIJDEN G W A M: "Construction of a polygonal model using the Fisher-ratio criterion" (1994-10-09), XP010215998
D3: DAHAI C ET AL: "Recognition of handwritten digits based on contour information" (1998-03-01), XP004101845
D4: QUANG MINH T ET AL: "An application of wavelet-based affine-invariant representation" (1995-12-01), XP004000007

2. It appears that independent claim 1 does not meet the requirements of the PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

The document D1 discloses (the references in parentheses applying to this document) the following features of claim 1:

- A method (abstract) of comparing at least two sets of multimedia data using shape information so as to provide a dissimilarity measure between the sets, a first set forming a reference set and the second set being compared relative to the first set, the method comprising steps of;
- a) providing a set of ~~approximately equidistant~~ contour points for each set of

multimedia data (page 209, right-hand column, lines 8-11: the sets of contour points are polygons),

- b) associating the contour points of the first set with contour points of the second set so as to define associated contour points (page 209, right-hand column, lines 11-13),
- c) calculating distances between said associated contour points (page 209, right-hand column, lines 28-39), and
- wherein the distances between said associated contour points are used to determine a dissimilarity measure between said sets of multimedia data, thereby providing an indicator of the degree of similarity between the sets (page 209, right-hand column, lines 28-39).

The feature that the contour points are approximately equidistant is not disclosed in D1. Therefore the subject-matter of claim 1 is new.

The problem solved by this feature is to avoid extrapolation of points while doing the matching between the contour points.
However, this is common knowledge in the field that to have a one to one relation between the points, the number of points has to be made equal (down sampling). Down-sampling of the contour points is disclosed in D1 (page 211, right-hand column, lines 8-11) where the boundary is replaced by a polygon.
Making the points equidistant is then the most natural choice for the skilled person.
This is disclosed for example in D2 (page 211, left-hand column, lines 37-42 and page 212, left-hand column, lines 1-12) or in D3 (section 3 on page 240, right-hand column, lines 24-25) taken separately.

As a consequence, the subject-matter of claim 1 is not inventive.

3. Dependent claims 2-18 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step (Article 33(3) PCT), the reasons being as follows:

3.1 The subject-matter of claim 2 is disclosed in D1 (page 211, right-hand column, lines 4-5). Contour tracing is moreover a well-known technique in the field.

3.2 The subject-matter of claim 3 is not inventive for the same reasons as given in paragraph 2 for claim 1, as it has no additional features above claim 1.

3.3 The subject-matter of claim 4 is disclosed in D1 (page 208, right-hand column, lines 5-14). Normalization is moreover a well-known technique in the field, solving a common problem.

3.4 The subject-matter of claims 5-10 is not inventive.
The problem solved by the features of these claims is to determine the starting points in order to optimize the efficiency of the shape comparison method.
This problem is well-known and disclosed for example in D1 (page 209, right-hand column, lines 8-15 and page 210, right-hand column, lines 14-16).
Different methods exist to choose these starting points, and the method used in the present application (using the most distant points from the centroid) is well-known in the field, as shown for example in documents D3 (section 3, on page 240, right-hand column, lines 32-35) or D4 (section 2.2 on page 1290) taken separately.
It is just a mere choice for the skilled person to choose one of these methods, without any surprising technical effect.
The use of percentage (even inputted by the user) to define the interval in which the starting points have to be is also obvious for the skilled person.
The remaining features in claims 5-10 are minor implementation details.

3.5 The subject-matter of claim 11 is not inventive, because the rotation of the set to be compared to align its starting point with the reference starting point is well-known, as disclosed for example in document D1 (page 209, right-hand column, lines 8-39).

3.6 The subject-matter of claims 12-15 is not inventive.
The same steps are applied in document D1 (sections 3.2 and 3.3, on pages 210-213) with the only difference that in D1, the distances between two consecutive contour points are not equal. However, the application of the equations (9) to (15) of document D1 to the case of N sample points for each shape contour and equal distances between respectively the points of the first set and the points of the second set, would give the result that the expected control point on the second set for one control point of the first set would be the control point or the next contour point.

Therefore, the same technical effect (minimising the distance while being deformation and noise robust) is also achieved in D1 using the same method.
The remaining features in claims 12-15 are minor implementation details.

3.7 The subject-matter of claims 16 and 17 is not inventive, for the following reasons :

- using the average of the distance to determine the dissimilarity degree is one possibility commonly used by the skilled person, as disclosed for example in D1 (page 209, right-hand column, equations (7) and (8)) or in D3 (page 240, left-hand column, equation (6)).
- using the standard deviation (or the variance) is also well-known in the field, as shown in D3 (page 240, left-hand column, equation (7)).
- using the circumference (or length of contour) is also well-known in the field as an important feature for recognition, as shown in D3 (page 240, left-hand column, section 3.2).

The particular equation provided in claim 16 is only a mere choice for the skilled person, without any surprising technical effect, using values which are commonly computed and combined to define the dissimilarity degree between shape contours.

3.8 The subject-matter of claim 18 is not inventive as it is disclosed in D1 (page 212, left-hand column, line 1 to right-hand column, line 14).

Claims

1. A method of comparing at least two sets of multimedia data using shape information so as to provide a dissimilarity measure between the sets, a first set forming a reference set and the second set being compared relative to the first set, the method comprising steps of;

   a) providing a set of approximately equidistant contour points for each set of multimedia data,

   b) associating the contour points of the first set with contour points of the second set so as to define associated contour points,

   c) calculating distances between said associated contour points, and

   wherein the distances between said associated contour points are used to determine a dissimilarity measure between said sets of multimedia data, thereby providing an indicator of the degree of similarity between the sets.

2. The method of Claim 1, wherein the set of contour points for each set of multimedia data is obtained by tracing the boundary of each set of multimedia data.

3. The method of Claim 1 or 2 wherein the sets of contour points are down-sampled to yield an equal number of approximately equally spaced apart contour points in each set.

4. The method of any preceding claim wherein the sets of contour points are translation and scale-size normalised prior to association with one another.

5. The method of any preceding claim further comprising the step of establishing starting points for each set of contour points, the starting points being established by defining all contour points for each set whose distances from a calculated centroid point of their respective contour are greater than a user-defined first percentage P1 of the most distant contour point from their respective centroid.